

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of Richard D. Bucholz

Art Unit TO BE ASSIGNED

Serial No. TO BE ASSIGNED

Filed February 5, 2002

For SYSTEM FOR INDICATING THE POSITION OF A SURGICAL PROBE WITHIN A
HEAD ON AN IMAGE OF THE HEAD

Examiner TO BE ASSIGNED

February 5, 2002

PRELIMINARY AMENDMENT ATO THE ASSISTANT COMMISSIONER FOR PATENTS,
Washington, D.C. 20231

SIR:

Prior to the examination of the above application which is being filed concurrently with this Preliminary Amendment A, please amend the specification consistent with this Preliminary Amendment A. The following amendments should be entered:

IN THE SPECIFICATION:

Immediately after the Title on line 1 of page 1 of the specification, please add the following:

This application is a divisional application of U.S. Application No. 09/457,699 which was filed on December 9, 1999; which was a continuation of U.S. Application No. 09/243,804, which was filed on February 3, 1999, which is now U.S. Patent No. 6,076,008; which was a continuation of U.S. Application No. 08/477,561, which was filed on June 7, 1995, which is now U.S. Patent No. 5,891,034; which was a continuation of U.S. Application No. 08/053,076, which was filed on April 26, 1993, which is now abandoned; which was a continuation-in-part of U.S. Application No. 07/909,097, which was filed on July 2, 1992, which is now U.S. Patent No. 5,383,454 and which was a continuation-in-part of U.S. Application No. 07/858,980, which was

filed on May 15, 1992, which is now abandoned. U.S. Application No. 07/909,097 was a continuation of U.S. Application No. 07/600,753, which was filed on October 19, 1990, which is now abandoned. U.S. Application No. 07/858,980, was a continuation-in-part of PCT Application No. US91/07745, which was filed on October 17, 1991; which was a continuation-in-part of U.S. Application No. 07/600,753, which was filed on October 19, 1990, which is now abandoned.

IN THE CLAIMS:

Please cancel claims 1-38.

Please add the following claims 39 - 57:

39. A method for correlating scan images of a body part, the method comprising:
storing images of a body part in a memory to create a three-dimensional body image coordinate system;
determining the position of the body part in the three-dimensional body image coordinate system using remote sensors;
obtaining a planar scan image of the body part;
determining the position of the planar scan image of the body part in the three-dimensional body image coordinate system;
retrieving from the images of the body part, an image of the body part corresponding to the position of the planar scan images; and
displaying the planar scan image and the image of the body part corresponding to the position of the planar scan image.

40. The method of claim 39, further comprising determining the boundary of the body part in the retrieved image and displaying the boundary of the body part.

41. The method of claim 40, further comprising determining the position of a probe in the three-dimensional body image coordinate system, retrieving from the images of the body part an image of the body part corresponding to the position of the probe, and displaying on the boundary of the body part an image representing the probe at the body part.

42. A method for correlating scan images of a body part, the method comprising:
storing images of a body part in a memory to create a three-dimensional body image coordinate system;
determining the position of the body part in the three-dimensional body image coordinate system using remote sensors;
obtaining a planar image of the body part;
determining the position of the planar image of the body part in the three-dimensional body image coordinate system;
retrieving, from the images of the body part, an image of the body part corresponding to the position of the planar image;
determining the boundary of the body part in the retrieved image; and
displaying the planar image and the boundary of the body part corresponding to the position of the planar image.

43. The method of claim 42, further comprising determining the position of a probe in the three-dimensional body image coordinate system, retrieving from the images of the body part an image of the body part corresponding to the position of the probe, and displaying on the boundary of the body part an image representing the probe at the body part.

44. The method of claim 42 wherein the obtained planar image of the body part is a scanned image.

45. A method for correlating scan images of a body part, the method comprising:
storing images of a body part in a memory to create a three-dimensional body image coordinate system;
determining the position of the body part in the three-dimensional body image coordinate system using remote sensors;
obtaining a planar image of the body part;
determining the position and orientation of the planar image of the body part in the three-dimensional body image coordinate system;
determining the position of a probe in the three-dimensional body image coordinate system;

retrieving, from the images of the body part, an image of the body part corresponding to the position of the probe; and

displaying the planar image and the image of the body part corresponding to the orientation of the planar image and position of the probe.

46. A method of claim 45 further comprising determining the boundary of the body part in the retrieved image and displaying the boundary of the body part.

47. A method of claim 45 wherein the obtained planar image of the body part is a scanned image.

48. A method of claim 45 further comprising displaying on the image of the body part an image representing the probe at the body part.

49. A method for correlating scan images of a body part, the method comprising:
storing images of a body part in a memory to create a three-dimensional image coordinate system, the images of the body part being correlatable to the body part;
positioning a body part in a body part coordinate system;
determining the position of the body part in the body part coordinate system using remote sensors;

correlating the images of the body part and the three-dimensional image coordinate system to the position of the body part in the body part coordinate system;

obtaining a planar scan image of the body;

determining the position of the planar scan image of the body part in the body part coordinate system;

determining the position of the planar scan image of the body in the image coordinate system based on the position of the planar scan image of the body part in the body part coordinate system;

retrieving, from the images of the body part, an image of the body part corresponding to the position of the planar scan image; and

displaying the planar scan image and the image of the body part corresponding to the position of the planar scan image.

50. The method of claim 49, further comprising determining the boundary of the body part in the retrieved image and displaying the boundary of the body part.

51. The method of claim 49, further comprising determining the position of a probe in the three-dimensional image coordinate system, retrieving from the images of the body part an image of the body part corresponding to the position of the probe, and displaying on the image of the body part an image representing the probe at the body part.

52. A method for determining the position of a body part in images of a body part, the method comprising:

reading first images of the body part from a memory, the images including previously scanned images of the body part in a three-dimensional image coordinate system, the body part having reference points in relation to the body part;

communicating the position of the body reference points to an array located remote from the body part;

determining the position of the body part in a three-dimensional body part coordinate system based on the communicated position of the body reference points;

correlating the position of the body part in the body part coordinate system to the position of the body part in the image coordinate system based on the position of the body reference points in the body part coordinate system and in the image coordinate system;

scanning the body part to obtain a second planar scan image of the body part;

correlating the second planar scan image of the body part to the first images of the body part;

retrieving, from the first images of the body part, an image of the body part corresponding to the position of the second planar scan image; and

displaying the second planar scan image and the image of the body part corresponding to the position of the second planar scan image.

53. The method of claim 52, further comprising determining the boundary of the body part in the retrieved image and displaying the boundary of the body part.

54. The method of claim 52, further comprising determining the position of a probe in the three-dimensional body part coordinate system, retrieving from the images of the body part

an image of the body part corresponding to the position of the probe, and displaying on the image of the body part an image representing the probe at the body part.

55. A system for determining the position of a body part in images of a body part, the system comprising:

an array separate from the body part;

body reference points fixed in relation to the body part, the position of the body reference points able to be communicate with the array to provide information concerning the position of the body part and establish a three-dimensional body part coordinate system;

a memory storing first images of the body part establishing a three-dimensional image coordinate system, the first images correlatable to the body reference points and the body part coordinate system, and the memory storing second planar scan images of a body part, the planar scan images correlatable to the body part coordinate system; and

a processor in communication with the array, the processor (i) determining the position of the body reference points and the body part in the three-dimensional body-part coordinate system based on the information provided by the body reference points and the array, (ii) determining the position of the body part in the three-dimensional image coordinate system based on the position of the body reference points in the body part coordinate system, (iii) correlating the first scan images of the body part and the image coordinate system to the body part coordinate system, (iv) correlating the second planar scan images to the body part coordinate system, (v) determining the position of at least one planar scan image of the body part in the image coordinate system, and (vi) retrieving, from the first images of the body part, an image of the body part corresponding to the position of the planar scan image.

56. The system of claim 55, further comprising a display for displaying the planar scan image and the first image of the body part corresponding to the position of the planar scan image.

57. The system of claim 56, wherein the processor determines the boundary of the body part in the retrieved image and displays the boundary of the body part on the display.

REMARKS

The Applicant files this preliminary amendment simultaneously with the filing of the divisional application Applicant's file SLU 4525.1 which is a divisional of U.S. Application No. 09/457,699 filed on December 9, 1999.

This divisional application has copendency with U.S. Application No. 09/457,699 filed December 9, 1999 which is under allowance.

The divisional application was based on the originally filed specification and claims of U.S. Application 09/457,699 which was filed on December 9, 1999. In 09/457,699 additional claims were added which included claims 39-100. During prosecution of 09/457,699, a restriction requirement was entered and claims 80-98 were withdrawn from examination in that case. With the filing of this Preliminary Amendment A, claims 80-98 from 09/457,699 have been entered in this case as new claims 39 - 57.

CONCLUSION

It is believed that there are no fees associated with this Preliminary Amendment A. If the Commissioner determines there are additional fees not herein provided, the Commissioner is hereby authorized to charge any required government fees to Deposit Account No. 19-1345.

Respectfully submitted,



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